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sistant Secretary of the Smithsonian Institution, offering to transmit for the Academy, free of expense, to any part of Europe, publications delivered at Washington; and also to deliver, free of expense, at Washington, any publications intrusted to its agents in Europe.

On motion of Mr. Treadwell, it was

“*Voted*, That the Corresponding Secretary be directed to present the thanks of the Academy to the Smithsonian Institution for its obliging offer.”

Dr. C. T. Jackson communicated the results of his analysis of a crystal of phosphate of lime from Hurdstown, New Jersey: —

“This crystal has a pale lemon-yellow color, and possesses a resplendent lustre on the surface, resembling the glazing produced by heat on a semi-fused mineral. Its specific gravity is 3.205. By analysis it was found to consist of

Phosphate of lime	92.405
Chloride of calcium	0.540
Peroxide of iron	0.040
Oxide of manganese	0.003
Fluoride of calcium, by difference,	7.012
	<hr/> 100.000

“It is, therefore, identical with apatite, and nearly of the same composition as that from Capo de Gata in Spain. Its formula will be $3 \text{ Ca}_3 \text{ P} + \text{Ca} (\text{Cl F})$.

“This mineral occurs in large quantities at Hurdstown, and is now extracted from the mine for use in agriculture; it has been also employed in England in the manufacture of earthen-ware. The presence of fluorine in most, if not all, native phosphate of lime, was remarked upon at a former meeting of the Academy, and its agricultural importance was then indicated.”

Three hundred and forty-fifth meeting.

April 1, 1851. — MONTHLY MEETING.

The PRESIDENT in the chair.

Lieutenant Davis presented a paper, relating to the deterio-

ration which, he stated, has been taking place in Boston harbor for a considerable period of time, and mentioned several striking facts in illustration of his statement.

Professor Eustis remarked that he could corroborate Lieutenant Davis's statement, from former personal observation.

Professor Peirce spoke of the great importance of the subject, and, on his motion, it was

“ *Voted*, That Lieutenant Davis's paper be referred to a committee of five.”

“ *Voted*, That Messrs. Treadwell, Eustis, Peirce, M. Wyman, and Lovering be that committee.”

Professor Peirce offered the following resolutions, which were unanimously adopted : —

“ *Resolved*, That Professor A. D. Bache, President of the American Association for the Advancement of Science, be requested and empowered to correspond, in the name of the Academy, with such foreign scientific bodies as may appear to him advisable, with a view to the union of scientific men of different nations, for the purpose of taking such steps as may best show their respect for the memory of the late Professor Schumacher, and their sense of the services which he has rendered to the science of the world.

“ *Resolved*, That, in the opinion of the Academy, the foundation of a Schumacher medal and prize would be most appropriate to the memory of our honored associate, — though the Academy, on its part, will of course concur in any plan that may be determined on.”

Professor Peirce presented a paper by Mr. U. A. Boyden, giving an account of a fall of rain at a temperature much below the freezing-point of water ; and also a paper by Rev. Thomas Hill, on the catenary curve.

Professor Agassiz communicated, at considerable length, the results of some of his observations, during the past winter, on the Florida Coral Reefs. He described their topographical features, structure, and mode of formation, and pointed out some striking differences between them and all other kinds of reefs hitherto observed. He stated that the present barrier reef succeeds to two others, more elevated, contained with-

in it ; and that the foundation on which they are built has not, like that of the reefs described by Darwin and Dana, been undergoing a process of subsidence or of elevation. He further stated, that a free generation of coral animals detach themselves from the parent stem, move through the water, and select new situations, favorable for building, on the dead corals. He exhibited a small mangrove-tree, and called attention to its very long and numerous roots, by which it strongly attaches itself to the coral sands, and thus confines them.

Mr. Desor made some remarks on the first appearance of the Vertebrata in geological strata. From the absence of the remains of Vertebrata in the Trenton limestone, which contains the remains of a variety of invertebrate animals, and also in two fossiliferous formations below the Bala limestone in England, he argued that Invertebrata must have existed long before the appearance of Vertebrata. Mr. Desor further remarked, that, inasmuch as the remains of reptiles have been found in the coal measures of Germany, fishes could not be regarded as the only representatives of vertebrate animals in the paleozoic series, unless we remove from this group the carboniferous formations.

Professor Agassiz stated, that he was satisfied, from an examination of the figures in Professor Burmeister's paper, that the fossils found in the coal measures of Germany, and described by him as the remains of reptiles, are the remains of fishes.

Mr. Whitney exhibited a specimen of iron, manufactured at Springfield, out of ore brought from Lake Superior, which, he stated, had been found on trial to possess uncommon strength.

Mr. Alger exhibited a remarkable specimen of fossil Sigillaria from the sandstone of the coal formation of Nova Scotia. It is fourteen inches in diameter, and three feet long ; the lower part bulging out, as if approaching the lower portion of the stock from which the roots proceeded. The flutings or longitudinal furrows upon its exterior, of an inch in width,

and parallel with each other, are so perfect as to produce the effect of a regularly fluted column wrought with a chisel. In some parts of these grooves, there are carbonized remains of the original plant. It is otherwise a perfectly silicified fossil of a grayish-white color. Mr. Lyell, who has visited the spot (South Joggins) from which the specimen came, has satisfactorily determined that the strata of sandstone, in which the *Sigillaria* and other coal fossils of Nova Scotia are found, form altogether a mass of 2,500 feet in thickness. As these fossils are dispersed through every part of this immense mass, at the lowest depth as well as near its surface, Sir Charles Lyell concludes that many forests which grew here must have been successively submerged, and changed to the condition in which we now find them. The fossil trees are in an erect position, and perpendicular to the planes of stratification of the sandstone; but as this rock is now inclined at an angle of twenty-four degrees, we have proof of its subsidence or change of position.*

Three hundred and forty-sixth meeting.

April 15, 1851. — SEMI-MONTHLY MEETING.

The PRESIDENT in the chair.

Professor Peirce presented a paper on Saturn's rings, by Mr. George P. Bond, in which the latter gentleman has carefully investigated the structure of those rings, and arrived at the result, that they are fluid, and variable in number. Professor Peirce also stated, as some of the results of his own researches upon the same subject, that no ring can exist around a planet which has not satellites; that a ring surrounding such a planet would fall into it; and that a fluid ring surrounding Saturn might at the maximum become subdivided into twenty rings.

Professor Agassiz communicated some new views upon the special homologies of Echinoderms; and pointed out, at considerable length, homologies in the structure of several speci-

* See Lyell on American coal plants, in his *Travels in North America*, Vol. II. p. 159.